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1749–1949

GEORGIUS PROCHASKA

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PROFESSOR OF ANATOMY, PHYSIOLOGY
AND OPHTALMOLOGY AT THE UNIVERSITIES
OF PRAGUE AND VIENNA

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Blížkovice Market square and G. Prochaska's natal house.

GEORGIUS PROCHASKA

a pioneer in medical science, was born 200 years ago at Blížkovice Moravia.

Faculty of Medicine of the Masaryk University and the Group of Physiologists at Brno issue this commemorative booklet to acknowlege the outstanding merits of their older countryman – mainly in the field of nervous physiology – and to revive very briefly the times and the milieu of his growth and life.

Home.

The birthplace of Georgius Prochaska is a small market town Blížkovice in the Jihlava district, situated since on the Jihlava–Znojmo railway about eleven min. train journey from Mor. Budějovice. This market town (including village of the same name incorporated in 1918) has an area of 2085 hectars with 1265 inhabitants in 320 holdings, all Czechs and almost all Catholics; it is situated on the S. E. slope of the Bohemian-Moravian plateau looking towards the valey of Znojmo on an old road from the Danube to Prague, in a district of busy life ever since the pre-historical times. Systematic archeological research of J. Palliardi and F. Vildomec shows that the district was fairly densely populated already in the neolithic period. There are many objects of that period found on labouring even before the systematic digging.

Blížkovice General view.

The low houses of Blížkovice, surpassed only by the bell-tower of the church, seem to lose themselves in the vast fields of the plain, bordered on the East and in the South by green waves of the woody hillocks and on the West by two hills: fires on one of them called in the old days to combat with the Austrian Germans and a small church on the other, altered by many subsequent additions, grew from a small rotunda belonging to the stronghold of Znojmo which provided – with the castle Bitov and other princes's castles on the river Dyje – a good protection to the young Slavonic state.

Since the end of the XVIth century until the abolition of serfdom in 1848, Blížkovice belonged to the holdees of the town Znojmo. The latter acknowleged all the privileges to the place which since 1589 is called market town. Privileges were also granted by the monarchs. The inhabitants were mostly farmers, but among the artisans are being recalled butchers, smiths and cartwights.

George Prochazka – often spellt Prochaska – was born April 10th 1749 in the house No. 7 on the market-square. His father was a smith and we can still find next to the old vaulted house a smith's workshop – now abandoned – where Mathias Prochaska worked to earn modest living for his familly.

A Mathias Prochaska is mentioned in local records of Blížkovice already in the 17th century, but he left for another nearby village. His son Martin returned however to Blížkovice. His elder son Paul took over father's holding and younger Mathias became smith *(faber ferrarius)* and settled also at Blížkovice. He did some farming and gardening on his rather small farm. He was very clever and skillful even outside his own trade which gained him a great esteem of his fellow-citizens, and the function of the head of the guild which he held until his death – 20th October 1763. He died 59 years old.

We do not know anything about George Prochaska's mother but her name – Rosina – and that she outlived her husband. She gave birth to nine children, four boys (Mathias who succeeded father in his trade, Bartholomew probably also a smith, George, Gaspard who died two weeks old) and five girls of whom three died as babies or children.

Schools.

Since his sixth year, George attended the local primary school, which was, according to contemporary chronicles, a very good one for the period. There was a school in Blížkovice already in the 17th century; since 1723 *ludi rector* Severin Weiser taught there until 1756 – the year of his death – helped by a *praeceptor*, František Hájek. Carefully kept parish records testify that they were experienced and excellent teachers. It would be a wonder had they not recognised the unusual talent of the boy and had they not further developed in their teaching his natural gifts. Very early George manifested his gifts and his liking for drawing and painting. At the same time the good chance of having for teachers good musicians awakened his lasting liking for music. He learnt at school singing an the violin. There was a great interest in music at that time in the small town due mainly to the enthusiastic priest Vyrazil. The church choir was a real concert platform where, with regard to the choice of compositions, the influence of near Jaroměřice with its famous conductor and composer Míča was very strong. The perfomances of church music at the cloister and of profane music at the castle of Jaroměřice were of a high level and were appreciated all round. These musicians visited also Blížkovice from time to time at the invitation of Father Vyrazil and thus young George had the opportunity of enjoying the charm of tunes, in the little church with nice sculptures and wood carvings. So grew slowly his attachment to fine arts which we can trace through all his life. The small prehistorical objects, not rare in the district, gave rise to another hobby – archeology, subject of his deep interest during his Prague professorship.

When he finished the primary school, George seemed of too slender physique to be able to follow his father's profession, The schoolmaster and priest, aware of his remarkable abilities, advised to continue his education.

Blížkovice Parish church and school (left).

With the idea that he may become a church minister, he was sent to the Gymnasium at Znojmo. He lived in the Capuchin friary and helped to ease the cost of his education in tutoring his fellows from wealthier families. He lost his father at the age of 14 and it should have been very hard for his mother to look after five children.

In spite of the material difficulties George remained during all his studies an excellent pupil who would be remembered later by his teachers with satisfaction. After six years' studies at Znojmo he leaves for Olomouc where he reads at the famous Lyceum a two years' course of „Philosophy", obligatory preparation for the University. He shows a great interest mainly in physics and mathematics and even later he finds inspiration for his physiological conceptions in the way of the exact sciences. He did not return to the Friars at Znojmo, but before he was able to study medicine, he fell ill and had to spend two years in his home. – The following lines by Dr Vladislav Kruta give his further adventures, after he left for Vienna.

(According to the informations of Mr. F. Jech and Mr. F. Ležák and the notes of Dr L. Drastich and Dr V. Kruta.)

Endeavours and achievements.

In Vienna he had a good chance of finding soon some private teaching to earn a modest living and to be able to begin his medical studies. His main interest was in anatomy and his curiosity about the human body could not be satisfied with the usual demonstrations performed for students, but he wanted to see the organs in their actual relations within the body. Soon he succeeded to get the permission for perfoming autopsies. He used to work till late at night to make preparations and to study the different organs to the very minute details of their structure. But twice he broke down under the strain of the work to be treated at the famous medical clinic of the great pioneer-clinician Prof. de Haen. Wen recovering from his second illness, he found opportunity for anatomical work in the hospital. Prof. de Haen noticed his nice drawings and preparations and wanting to help the needy gifted student, to back his passion for the science and to secure the young man's efforts for his own department, he offered him a post of clinical assistant. Prochaska remained in this position until his master's death in 1776. In the same year he took his medical degree and came in close contact with the Maltese Joseph Barth, professor of anatomy, physiology and ophthalmology. Barth was apparently very fond of his collaborator – four years younger than himself; besides their common scientific interests, they were both interested in the arts, and through Barth's meditation Prochaska became, in 1778, extra-ordinary Professor of Anatomy and Physiology, and the same year, having taken the degree of Magister of Opthalmology, he took over the vacant chair of anatomy at Prague. He also taught opthalmology and a few years later took over physiology with higher anatomy. He remained in Prague for thirteen years and published there, in 1784, in his *Adnotationes Academicae*, his most famous work *Commentatio de functionibus systematis nervosi*, to which we shall refer again later on. He was also among the early members of the *Societas Scientiarum Regni Bohemiae* (Königliche böhmische Gesellschaft der Wissenschaften, which started in 1780, at first as a private Society of a few Czech scholars) and published several shorter papers in its Abhandlungen. He also established in Prague an anatomical collection, in which Hyrtl, when taking over the anatomical institute in Prague in 1837, found „many valuable things."

Prochaska had, both in Prague and later in Vienna, an extensive ophthalmic practice, and is reported to have made over 3,000 cataract operations – quite an impressive figure for that period, considering that it surpasses that of the famous founder of the Viennese Ophthalmological School and Prochaska's rival Joseph Beer who devoted hilmself entirely to ophthalmology. Prochaska's main scientific interests were, of course, elsewhere, and we find in his voluminous literary work just one paper on eye affections (Moh-

Prochaskas' house.

renheim's Beytrage, 1783 though he gained an important reputation as practical ophthalmologist.

Prochaska's contributions to anatomy and physiology are much more interesting and valuable, and grant him a significant place in the history of these sciences. Joseph Hyrtl, undoubtedly the greatest personality among Prochaska's successors in the Chair of Anatomy at Prague and Vienna, had a high opinion of his anatomical work, and praises him as „the first and only Viennese anatomist who left behind him a deep and lasting trace of his activity... He was, what practical anatomists seldom are: a thinker". This appreciation is the more significant as Hyrtl plainly expressed his sarcastic and pungent judgments about many other of his predecessors, and did not spare even Prochaska from some cutting remarks on his weak points.

Prochaska's contribution is not limited to the naked eye anatomy, and his microscopic studies, as Kölliker mentions, rank him among those few scientists of the 18th century who are rightly regarded for their outstanding contributions as pioneers of histology.

Many other prominent scientists – Longet, Pflüger, Vulpian, Neuburger, Fearing and others – expressed similar appreciation of his contributions to physiology. It is, however, hardly possible to draw a line dividing his contributions to anatomy from those to physiology. Anatomy was for him rather a stepping-stone, a basis for the understanding and interpretation of different body functions, which he followed from both morphological and physiological aspects. We can see that, for example, in his best known series of anatomical research, viz. in the morphology of the distribution of blood vessels in different tissues and organs. Prochaska learnt from Barth

Prochaskas' house — court.

a method of injecting blood vessels, a method previously used by Ruysch and Lieberkühn, and lost after the latters's death, because he had kept it secret. Reinvented by Barth, this method was brought by Prochaska to greater perfection and used by him not only for the study of the blood and lymphatic vessels, but applied also to the investigation of the course of seminal tubules and of the ear cavities. His collection of injection preparations in the museum of the Institute of Anatomy was very famous and greatly admired by foreign medical visitors, as is testified by several contemporary travel and correspondence publications. One of these visitors, in 1814, the distinguished British physician, Richard Bright, in his „Travels from Vienna to Lower Hungary", describes Prochaska's collections and praises his technique.

Prochaska's research in these subjects was the part of his scientific work most appreciated by his contemporaries. His descriptions of the distribution of the blood vessels in the intestine confirmed and completed the earlier findings of Lieberkühn. Prochaska was the first to give an accurate picture of the blood vessel ramifications up to the very minute ones in the muscles. His technique of injecting capillaries was considered then extremely fine and enabled him to give the most detailed description of the time of their course and ramifications.

This anatomical investigation was for him the starting point of a conception of the nutrition of tissues, developed in detail in a monograph (1810). He emphasised the importance of blood supply for muscular activity and pointed out that blood circulation plays an important part in the absorption of certain tissues and organs which, having been necessary at one stage of the development, are replaced at a later stage by others more expedient.

Prochaskas' house — old vault.

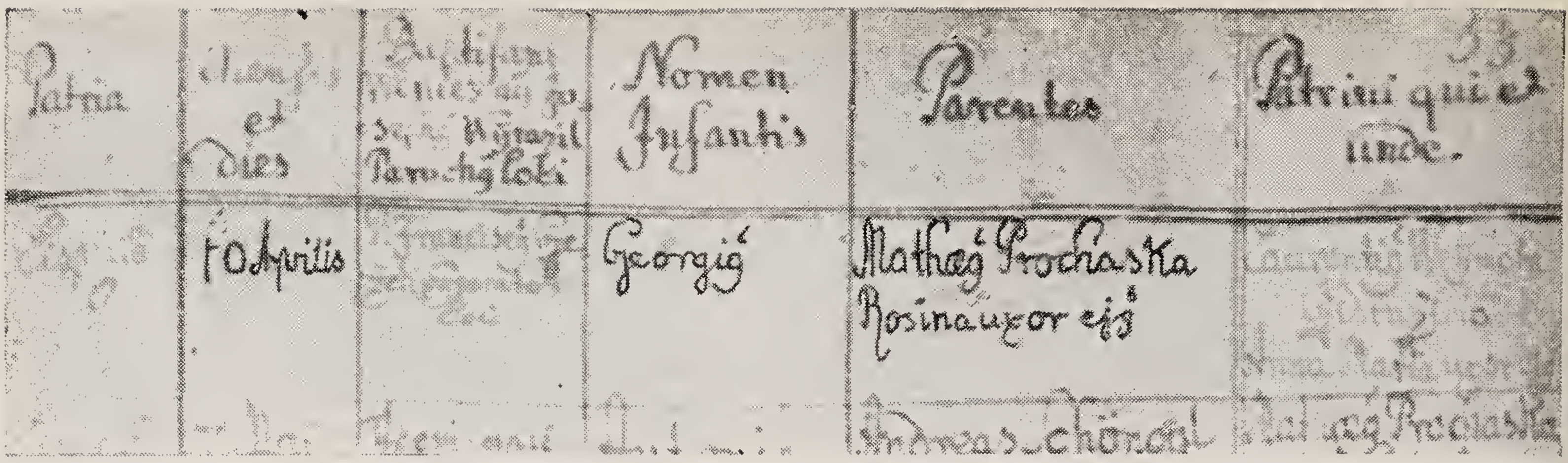
So he developed a theory of bone ossification, where he rightly insists that it does not occur by a mere hardening or transformation of the cartillage into bone, but that the former is driven back and „destroyed" by the bone formed and growing in its midst. And he points out the coincidence of this process with the growing of blood vessels in the ossification area. We cannot deal here with all the other noteworthy contributions of Prochaska to the macro- and microscopical anatomy of different organs, but we may still mention his descriptions and pictures of the elementary muscle fibre, sarcolemma and striation in voluntary muscles *(De carne musculari,* 1778); in his other early anatomical treatise, De *structura nervorum* (1778), we learn that he knew neurilemma (often called „Schwann's sheet"). He gives the first accurate description (with drawings) of the olivary bodies, and he first drew the important parallel between the *portio major* and *portio minor* of the fifth cranial nerve and the posterior and anterior roots of the spinal nerves.

That was an important observation, and Prochaska undoubtedly suspected that this anatomical arrangement, and the striking parallel between the spinal and trigeminal roots in their relation to the spinal and Gasserian ganglions, had some functional significance. It is amazing how nearly he approached to the fundamental discovery of the difference in conduction of anterior and posterior roots, established later by Charles Bell and François Magendie.

Already in his anatomical treatise, *De structura nervorum,* he assumed the existence of separate centrifugal and centripetal nervous fibres, but it was only in later years that he speculated about the possibility of this functional dualism corresponding to the anatomical dualism of anterior and posterior roots. If he did not actually discover this most important phenomenon, he has at least the merit of having foreshadowed it, and having prepared the way for his more fortunate followers.

Forge and workshop where Georgius Prochaska's father and brother probably used to work.

But his contribution to the understanding of the nervous system – „the most important of all organs in the animal economy" – did not end with his anatomical study, and, as with his work on blood supply, the anatomical research was followed by physiological studies, experiments and conceptions. He carried out this work at Prague. He went there in 1778, the year *De structura nervorum* was published – and probably found there more interest in these problems, as his predecessor Klinkosch with his collaborators Trzebiczky, Gruber as well as professor Michelitz and Dr Reuss had been engaged in studies of irritability and sensibility raised by the work of Haller. Six years after his arrival to Prague he published the results in his most important and best known treatise *Commentatio de functionibus systematis nervosi* included in the third part of his *Adnotationum academicarum* (Prague, 1784), where he formulated his general conception of nervous activity including the theory of reflex action. This little book is a real masterpiece, remarkable for its clarity of style and systematic presentation of all the then known material, which is analysed and discussed in a true scientific spirit, quite exceptional and outstanding in the contemporary nervous physiology. It is true that many fundamental facts concerning the reflex action had been already established and that several theories of the nervous reflexion had been formulated by his predecessors (Descartes, Willis, Whytt, Unzer and others). But the current doctrines of nervous physiology were still influenced – if not dominated – by the ideas of the mysterious nervous fluid and animal spirits, in spite of serious objections and doubts raised by a few rational



Patria

et dies

Nomen Infantis

Parentes

Patrini qui et unde.

10 Aprilis

Georgius

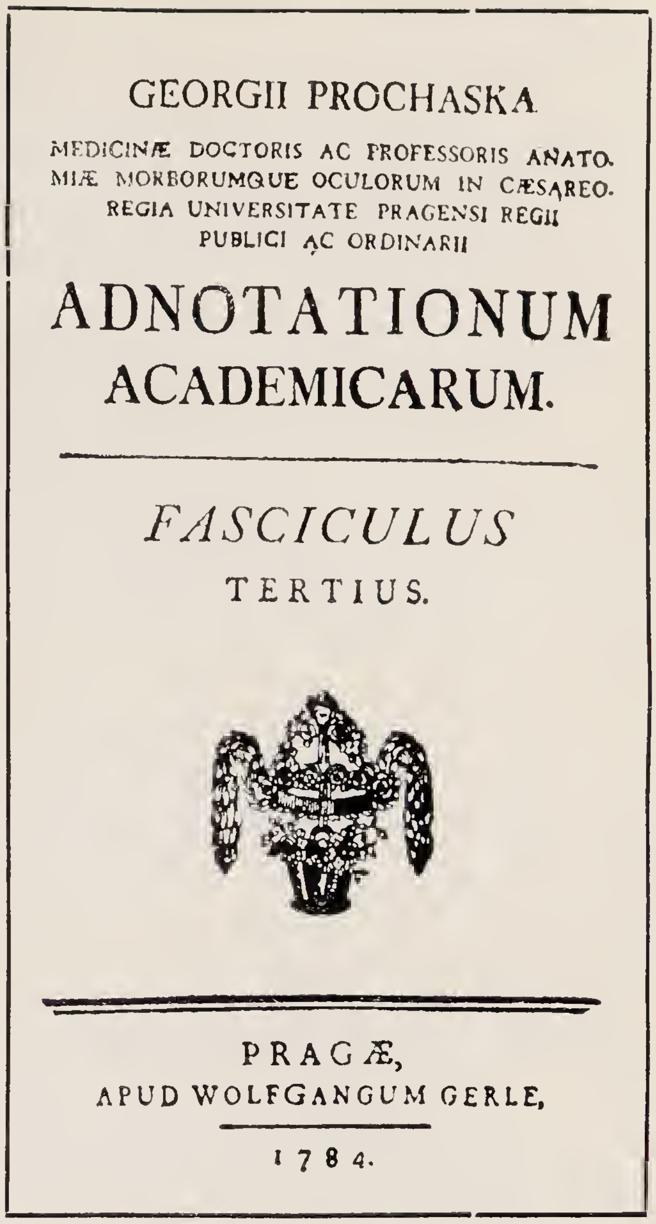
Matheus Prochaska
Rosina uxor ejus

Georgius Prochaska's birth record.

minds. Prochaska who thoroughly mastered the contemporary knowledge, was very sceptical about these and other conjectures and hypotheses *a priori* which could not be tested by experiments, convinced that they were more harmful than useful obscuring the truth. He attempts therefore to explain nervous activity by facts only – *per mera facta.* He inspired himself by the Newtonian method so successful in physics and tried to apply it – in opposition to the older views of Descartes – also to physiology.

It would be most interesting to give some quotations and discuss more in detail the different important points in Prochaska's conception of the reflex action; that would, however, be outside the scope of this article. We can say that Prochaska really succeeded in his rational analysis, not only in putting the existing knowledge into shape, but also in foreseeing the new developments and anticipating some of the basic properties of the nervous system – logically necessary in his thesis, but established by experimental proofs only many years later. He rendered also an important service to the nervous physiology by sweeping away the old erroneous doctrines, which obscured the truth and hindered the progress in this important branch of physiology. We can see in his conception a basis on which the modern conceptions could have been built and new discoveries brought into proper light.

We may perhaps remind that Prochaska's work on nervous system is not unknown to the English speaking neurologists and physiologists. Indeed, it was involved nearly 20 years after its author's death in the bitter controversy over the originality of discoveries and conceptions of the eminent British neurologist and neuro-physiologist Marshall Hall. – Shortly after Hall published his two famous Memoirs on the nervous system (1837), J. D. George,



GEORGII PROCHASKA
MEDICINÆ DOCTORIS AC PROFESSORIS ANATOMIÆ
MORBORUMQUE OCULORUM IN CÆSAREO-REGIA
UNIVERSITATE PRAGENSI REGII
PUBLICI AC ORDINARII

ADNOTATIONUM
ACADEMICARUM.

FASCICULUS
TERTIUS.

PRAGÆ,
APUD WOLFGANGUM GERLE.
1784.

one of the presidents of the Medical Society of University College, London read at its meeting of March 30th, 1838 a paper on the history of the nervous system in which he pointed out from the material reviewed that Marshall Hall had been anticipated in most essential phenomena as well as in their interpretation, claimed as original, by several earlier authors. George quoted Professor Sharpey to the effect that of all previous physiologists, Prochaska had approached most nearly in his views to those at present entertained and remarked that in Dr Hall's account of the opinions of former physiologists no such author is mentioned or even alluded to. After a review of earlier contributions he gave long quotations of Prochaska and compared his statements with those of Marshall Hall pointing out their striking similarity. We do not want, however, to linger on this controversy recently reviewed in Fearing's monograph or to underrate the importance of Marshall Hall's contribution to the progress of nervous physiology. But it shows that the controversy recorded in the British medical press of that period drew attention to Prochaska in Great Britain and elsewhere.

His work on the nervous system – although reprinted in his *Opera Minora* (1800) – was little known during his lifetime, or rather its true value was not grasped until some years after his death. Until 1838 it was probably more read than quoted. In the controversy between Marshall Hall and his contemporaries George quoted Prochaska's texts extensively, and in 1839 Alexander Walker reprinted his chapter on *sensorium commune* with an English translation in his anonymous „Documents and Dates on Modern Discoveries in the Nervous System“, and in 1851 the whole of the *Commentatio* was published in T. Laycock's translation by the Sydenham Society. In France, he was extensively quoted and his contribution highly estimated by Longet, in Germany by Pflüger, in Austria by Jeitteles and Neuburger.

Jules Soury in his monumental work on the history of doctrines on the nervous system (1899) pays high tribute to the originality of the truly scientific approach which enabled Prochaska to formulate the first general theory of nervous action.

Prochaska had a similar rationalistic approach to the other phenomena of life, and in the five editions of his textbook of physiology he insists on the necessity of considering „the so-called vital forces not as some special forces peculiar to living organismus but as the common forces of Nature, which are however combined and interrelated one to another, and as their relations are not yet known, it is for the time impossible to find out their different respective actions“. This is again the Newtonian approach, an attitude which enabled the progress of biology at its great epoch. And Prochaska was one of the few who preached it at its dawn and who prepared the way for the others.

In 1791, when Professor Barth retired, Prochaska succeeded him in Vienna, where, since 1805, he restricted himself to the teaching of „higher“ anatomy, physiology and ophthalmology.

It is interesting that Prochaska still lectured in Latin even during the last decade of his career, although already at the time of Josephine's reforms the vernacular – which meant German under the old Monarchy – was generally substituted for the former international Latin, and indeed in the early 19th century all subjects, with the exception of Physiology, and *materia medica* (where Latin seemed more appropriate to the subject) were read at the University of Vienna in German.

Prochaska retired in June 1819 after a long and successful career, rewarded by the acknowledgment of the scientific societies and distinctions of the Court. He died next year, on July 17th, 1820, in Vienna, leaving behind him quite a voluminous literary work: its list, possibly not quite complete, contains 31 titles – 17 papers and 14 books, of which four are in two volumes and one in three editions.

In this brief paper we cannot of course do justice to the whole of the work and all the achievements of this brilliant anatomist and, as we have seen, essentially modern physiological thinker. It sketches at least, we hope, the place he occupies in the history of medical science, which is, according to several authorities – quite an important one. *Vladislav Kruta.*

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